

Applicant: Michael SCHLITZKUS et al.
Docket No. R.305131
Preliminary Amdt.

AMENDMENTS TO THE SPECIFICATION:

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 2004/000514 filed on March 13, 2004.

[0000.6] BACKGROUND OF THE INVENTION

Please replace paragraph [0001] with the following amended paragraph:

[0001] Prior Art **Field of the Invention**

Please replace paragraph [0002] with the following amended paragraph:

[0002] The invention is ~~based on a directed to an improved~~ piston pump ~~as generically defined by the preamble to claim 1. A piston pump of this kind is~~ of the type used in particular in hydraulic units of hydraulically controllable brake systems in vehicles and is used to produce the required pressure for modulating brake pressures in the different wheel brake cylinders.

Please add the following new paragraph after paragraph [0002]:

[0002.5] Description of the Prior Art

Please replace paragraph [0003] with the following amended paragraph:

[0003] A piston pump of ~~this generic type~~ the type with which this invention is concerned is already known, for example, from DE 199 28 913 A1{[.]} ~~This known piston pump which~~ is comprised, among other things, of a pump housing that contains a pump bore into which a bushing is inserted. The bushing axially guides a pump piston that can be driven into a reciprocating stroke motion. To that end, the piston cooperates with a rotating cam and a

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return element in the form of a compression spring. This known piston pump is supplied with pressure fluid via a pressure fluid inlet and a pressure fluid outlet, which are respectively connected to inlet and outlet conduits for the pressure fluid in the pump housing. In order to damp pressure pulsations that are generated by the working principle of the piston pump, a throttle is provided in the outlet conduit that drains away the pressure fluid. This outlet conduit is provided on the inside of a sealing piece, which seals the pump bore off from the environment. No filter is provided to protect the throttle from becoming clogged by impurities in the pressure fluid. The outlet conduit extends along the end surface of the bushing and feeds directly into a pressure fluid conduit leading radially away from the piston pump.

Page 2, please replace paragraph [0004] with the following amended paragraph:

[0004] Based on this prior art, the object of the invention is to propose provide a design that makes it possible to inexpensively provide a filter and a throttle while simultaneously not requiring much space, and also offers the possibility of connecting an additional damping element in parallel with the filter in order to further improve the damping properties. This object is attained ~~with a subject that has the features of claim 1 in that~~ in an embodiment in which at least part of the pressure fluid outlet is routed along the circumference surface of the bushing and in that in the region of this section routed along the circumference surface, a filter and a throttle are provided, which are of one piece with the bushing.

Please replace paragraph [0005] with the following amended paragraph:

[0005] Advantages of the Invention

SUMMARY AND ADVANTAGES OF THE INVENTION

Please delete paragraph [0007].

Page 3, please replace paragraph [0008] with the following amended paragraph:

[0008] According to claims 2 and 3, it It is particularly advantageous to provide the filter and the throttle in separate radial ribs spaced axially apart from each other, which extend in the circumference circumferential direction of the bushing. This allows the bushing to be produced in the form of a turned component, an inexpensive, precise method that requires no alteration. It is thus possible to eliminate costly machining steps, e.g. for producing the course of a conduit, which steps are required in the above-cited prior art. The same is true for the production of the filter and throttle in the form of recesses that are open toward the outside and are disposed in the radial ribs ~~according to claim 4. In addition, this~~ This embodiment is particularly easy to produce from a production engineering standpoint and can also, in terms of functional tolerances, be easily controlled and varied. ~~Claim 10 proposes a~~ A particularly effective parallel-connected damping element whose damping housing has an elastomer piece inserted into it~~[[.]]~~ ~~This damping element~~ provides not only an additional damping volume, but also increases the elasticity in the system and therefore the damping action because the elastomer piece has a lower modulus of elasticity than the pressure fluid. The recess extending in the longitudinal direction in the elastomer piece facilitates its installation on the one hand and on the other hand, increases the area of the elastomer piece that is subjected to the pressure fluid. The latter results in an improvement in the damping properties and in a more uniform load on the elastomer piece.

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Please replace paragraph [0009] with the following amended paragraph:

[0009] Drawings **BRIEF DESCRIPTION OF THE DRAWINGS**

Please replace paragraph [0010] with the following amended paragraph:

[0010] An exemplary embodiment of the invention is ~~shown in the drawings and will be explained in detail in the subsequent description: herein below, with reference to the drawings, in which:~~

Page 4, please replace paragraph [0011] with the following amended paragraph:

[0011] Fig. 1 is a longitudinal section through a piston pump according to the invention, with an additionally attached damping element installed in a pump housing, and

Please replace paragraph [0013] with the following amended paragraph:

[0013] Description of the Exemplary Embodiment

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please replace paragraph [0014] with the following amended paragraph:

[0014] Fig. 1 shows a detail of a pump housing 10 with installation spaces 12 (12a - 12d) provided in it to accommodate different components, which are not shown here for the sake of clarity, and with pressure fluid-carrying conduits 14 that hydraulically connect these installation spaces 12 to one another. The inner diameters of these installation spaces 12 have multiple steps and are each open toward the outside of the pump housing 10. This design makes it possible to embody the pump housing 10 in the form of a light alloy block that can be inexpensively produced using an extrusion press and to machine this block to produce inlet chambers 12 and conduits 14 by means of a cutting process that requires as few set-ups as

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possible. The longitudinal axes of the installation spaces 12 and conduits 14 are aligned essentially at right angles to one another for ease of production.

Please replace paragraph [0015] with the following amended paragraph:

[0015] A first installation space labeled 12, with the position number 12a, serves to accommodate a cam, not shown, for actuating a pump piston 16 of a piston pump 18, a second installation space 12b serves to accommodate a solenoid valve, not shown, connected to a pressure fluid inlet 20 of a piston pump 18, a third installation space 12c, together with a press-fitted hollow body that is closed at one end, encloses a damping element 90 that can be optionally provided to damp the pressure pulsations generated by the piston pump 18, and a fourth installation space 12d contains the piston pump 18 itself, which is embodied according to the invention.

Page 7, please replace paragraph [0022] with the following amended paragraph:

[0022] This sealing cover 38 is press-fitted into the installation space 12d of the piston pump 18 and is operationally connected to the bushing 24 by means of an axially extending collar 80. With its end pointing into the interior of the installation space 12d, the sealing cover 38 rests against the end surface of the bushing 24. A groove-shaped recess along this end surface and along the inside of the circumferential collar 80 constitutes an outlet conduit 83, which connects the pressure fluid outlet 82 of the piston pump 18 indirectly to a pressure fluid conduit 14a in the pump housing. Before feeding into the pressure fluid conduit 14a, the pressure fluid consequently flows partway along the circumference circumferential surface of the bushing 24. To achieve this, the outer diameter of the bushing 24 is recessed in

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relation to the inner diameter of the installation space 12d and is provided with radial ribs 84 extending around its circumference, which are of one piece with it. The circumferential edge of these radial ribs 84 rest against the wall of the installation space 12d and are spaced apart from one another axially in the direction of the longitudinal axis of the piston pump 18. This produces a number of annular chambers 86 disposed one after another in axial sequence.

Please replace paragraph [0023] with the following amended paragraph:

[0023] The first radial rib 84a oriented toward the pressure fluid outlet 82 constitutes a filter that is embodied in the form of an edge filter in that it has a number of groove-shaped recesses 88a that are disposed distributed over the circumference of the radial rib 84a (Fig. 2). These recesses 88a are open toward the outside and pass through the radial rib 84a. They therefore permit the passage of pressure fluid from one annular chamber 86a to another 86b, but because of their number and dimensions, retain dirt particles contained in the pressure fluid. The second radial rib 84b disposed after the first radial rib 84a constitutes a throttle, which is similarly embodied in the form of an edge throttle. This throttle is likewise comprised of at least one recess 88b that passes through the associated radial rib 84b and is open toward the circumference side. Its cross section is matched to the cross sections of the filter in such a way that the sum of the individual cross sections of the filter is a multiple of the cross section of the throttle, but each individual cross section is smaller than the cross section of the throttle. Preferably, the recesses 88a of the filter are radially circumferentially offset from the recesses 88b of the throttle to achieve a particularly favorable damping action by producing a flow diversion. The filter prevents the throttle from becoming clogged with impurities in the pressure medium and thus prevents a pressure increase in the high-pressure

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region of the piston pump 18 to a level that could cause the sealing cover 38 to be pressed outward and/or could cause a hydraulic overload of the above-described components of the piston pump 18.

Page 8, please replace paragraph [0024] with the following amended paragraph:

[0024] The bushing 24 can be produced in a particularly inexpensive fashion in the form of a turned component if the two radial ribs 84a, 84b that constitute the filter and the throttle have the same outer diameter. When installed in the piston pump 18, the radial ribs 84a, 84b, produce a press-fit connection with the wall of the installation space 12d.

Page 10, please replace paragraph [0028] with the following amended paragraph:

[0028] The elastomer piece 4 inserted into the hollow body 92 has continuous longitudinal recesses 98. On the one hand, these recesses or grooves allow the air contained in the hollow body 92 to flow out while the elastomer piece 94 is being installed and on the other hand, they increase the area of the elastomer piece 94 exposed to pressure, thus evening out the pressure strains to which the elastomer piece 94 is subjected. Silicone rubber is particularly suitable as a material for the elastomer piece 94 because of its resistance to the pressure fluid used in vehicle brake systems and because it has a lower modulus of elasticity than the pressure medium. It is therefore possible with a relatively low volume of the damping element 90 to achieve an elasticity of sufficient magnitude for the desired damping properties.

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Page 11, please add the following new paragraph after paragraph [0031]:

[0032] The foregoing relates to a preferred exemplary embodiment of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.